5700A
CALIBRATOR

Remote Programming Reference Guide

FLUKE

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SYNTAX RULES

SPACES:	At least one space is required between a command and a parameter. No spaces are allowed within a parameter, or within a number.
MULTIPLE PARAMETERS:	When a command has more than one parameter, the parameters must be separated by commas. For example: "OUT 1 V, 100 HZ".
NUMERIC PARAMETERS:	These may have up to 255 significant figures and their exponents may a range from -32000 to +32000. The useful range for 5700A programming is ± 2.2 E-308 to ± 1.8 E308.
CASE SENSITIVITY:	All lower-case letters are converted to upper-case. except in quoted string.
EXTRA PARAMETERS:	Including too many parameters causes a command error.
NULL PARAMETERS:	Null parameters cause a command error (e.g., the adjacent commas in "CLOCK 133700, , 071787").
EXPRESSIONS:	Expressions, for example "(4+2*13)", are not allowed as parameters.
UNITS:	Accepted units in command parameters are: • HZ (frequency, hertz) • MHZ (frequency, megahertz) • V (voltage, volts) • A (current, amperes) • OHM (resistance, ohms) • MOHM (resistance, megohms) • DB (decibels) • DBM (decibels referenced to 1 milliwatt for ac voltage amplitude) • PCT (percent) • PPM (parts per million)
MULTIPLIERS:	Accepted multipliers in command parameters are: • MA (mega, or unit x 1,000,000) • K (kilo, or unit x 1,000) • M (milli, or unit ÷ 1,000; except MOHM and MHZ) • U (micro, or unit ÷ 1,000,00)

SYNTAX RULES (cont)

MULTIPLIERS (cont): Examples of allowed unit and multiplier combinations are:

- "MOHM" and "MAOHM" are both interpreted as megohms
- "MHZ" and "MAHZ" are both interpreted as megahertz
- "MV" is interpreted as millivolts
- "MAV" is interpreted as megavolts
- "MA" is interpreted as milliamperes

MULTIPLE COMMANDS: You can combine commands in one statement using a semicolon ";". For example, these are equivalent:

```
20 PRINT @3,"OUT 100 MV"   ! Select 100 mV dc
30 PRINT @3,"OPER"         ! Activate the output

20 PRINT @3,"OUT 100 MV ; OPER"
```

TERMINATORS: Sent by the 5700A: LF with EOI.
Received by the 5700A: LF or any character with EOI

RESPONSES: The responses described in the command table are correct for IEEE-488 remote control, and for serial remote control in "COMPUTER" mode. In serial remote control in "TERMINAL" mode, responses contain more descriptive text intended for an operator using a terminal interactively.

COMMAND SUMMARY BY FUNCTION

ERROR MODE COMMANDS

ADJOUT?	Returns the adjusted output magnitude and frequency
INCR	Increments or decrements the output
MULT	Multiplies the reference by a value and establishes a new reference
NEWREF	Establishes a new reference
OFFSET	Sets and enables or disables an offset
OFFSET?	Returns the value of the present offset
OLDREF	ets the output to the present reference
OUTERR?	Returns the UUT error computed by the 5700A
REFOUT?	Returns the value of the present reference
SCALE	Activates and deactivates scaling
SCALE?	Returns scaling information
SCAL__ERR?	Returns the value of the scale error if scaling is active

INSTRUMENT CONFIGURATION COMMANDS

BTYPE	Selects the amplifier type for voltage or current boost
BTYPE?	Returns the amplifier types set for voltage and current boost
CLOCK	Sets the clock/calendar
CLOCK?	Returns the setting of the clock/calendar
CUR__POST	Selects the active binding post for current output
CUR__POST?	Returns the active binding post for current output
EXTGUARD	Opens and closes an internal connection between GUARD and LO
EXTSENSE	Opens and closes an internal connection between SENSE and OUTPUT
FORMAT	Restores calibration constants and setups to factory defaults
LIMIT	Sets positive and negative output limits
LIMIT?	Returns the programmed positive and negative output limits
LRN?	Returns a list of commands that would duplicate the present state
RANGE?	Returns the present output range
RANGELCK	Locks in the present range, or selects autoranging

OUTPUT COMMANDS

BOOST	Activates or deactivates an auxiliary amplifier
DBMOUT	Returns the output amplitude and frequency, but in dBm if ac V
OPER	Activates the 5700A output if it is in standby
OUT	Sets the output and establishes a new reference for error mode
OUT?	Returns the output amplitude and frequency
PHASE	Sets the phase shift of the phase output signal
PHASE?	Returns the phase shift of the phase output signal

COMMAND SUMMARY BY FUNCTION (cont)

PHASELCK	Activates or deactivates phase locking to an external signal
PHASESFT	Activates or deactivates variable phase output
RCOMP	Activates or deactivates two-wire compensation circuitry
STBY	Puts the 5700A in standby
VOUT?	Returns the output amplitude in volts if the active units are dBm
WBAND	Activates or deactivates the Wideband AC Module (Option 5700A-03)

OVERALL FUNCTIONS

*CLS	Clear; clears status registers, any service request, and flags
ECHO?	Echos a string to the remote port
GAL	Go to Alternate Language; enters Fluke 5100B emulation mode
*OPC	Sets bit 0 in the ESR to 1 when pending operations are complete
*OPC?	Returns a "1" when all pending remote operations are complete
*PUD	Stores a string of user-selected characters in nonvolatile memory
*PUD?	Returns the contents of the PUD memory
RPT_STR	Loads the user report string
RPT_STR?	Returns the user report string
*RST	Reset; sets the 5700A to its default power-up state
UNCERT?	Returns the calculated absolute uncertainty of the output
*WAI	Halts program execution until pending operations are complete

RS-232-C INTERFACE PARAMETER SETTING COMMANDS

SP_EOF	Sets the End-Of-File (EOF) string
SP_EOF?	Returns the End-Of-File (EOF) string
SP_SET	Sets RS-232-C interface parameters
SP_SET?	Returns RS-232-C interface parameters
SP_TIME	Sets the timeout period
SP_TIME?	Returns the timeout period

5700A CALIBRATION, TESTING, & DIAGNOSTICS COMMANDS

CAL_ADJ	Does the internal portion of calibration
CAL_CHK	Starts calibration check
CAL_CLST?	Returns a group of calibration constant names and their values
CAL_CONST?	Returns the value of a particular constant
CAL_DATE?	Returns the date of the most recent calibration
CAL_DAYS?	Returns the days elapsed since last calibration recall
CAL_INTV	Sets the calibration interval

COMMAND SUMMARY BY FUNCTION (cont)

CAL__INTV?	Returns the calibration interval
CAL__PR	Prints a calibration report out the serial interface
CAL__REF	Does a calibration procedure using a 1Ω, 10 kΩ, or 10V standard
CAL__RNG	Starts a self calibration procedure of a range
CAL__RPT?	Returns a formatted calibration report
CAL__SHIFT?	Returns the shift of a range due to a calibration action
CAL__SLST?	Returns the shifts of a group of ranges
CAL__STORE	Stores new calibration constants in nonvolatile memory
CAL__TEMP	Sets the temperature for calibration
CAL__TEMP?	Returns the calibration temperature last specified
CAL__WBFLAT	Does Wideband AC Module (Option 5700A-03) flatness calibration
CAL__WBGAIN	Does Wideband AC Module (Option 5700A-03) gain calibration
CAL__ZERO	Does internal zeros calibration
DIAG	Runs self diagnostics
DIAGFLT	Sets the 5700A response to faults in remote diagnostics
DIAGFLT?	Returns the 5700A response to faults in remote diagnostics
STOP__PR	Stops printing a report
*TST?	Begins a series of self tests and returns the results

SERIAL ONLY REMOTE COMMANDS

LOCAL	Puts the 5700A into the local state
LOCKOUT	Puts the 5700A into the local lockout state
REMOTE	Puts the 5700A into remote state

STATUS COMMANDS

*ESE	Loads the Event Status Enable register
*ESE?	Reads the Event Status Enable register
*ESR?	Reads and clears the Event Status Register
ETIME?	Returns the cumulative number of minutes power has been on
EXPLAIN?	Decodes a fault code by returning a brief description
FAULT?	Returns the most recent fault code from the fault queue
*IDN?	Returns 5700A identification information
ISCE	Loads the Instrument Status Change Enable register
ISCE?	Reads the Instrument Status Change Enable register
ISCR?	Reads and clears the Instrument Status Change Register
ISR?	Reads and clears the Instrument Status Register
ONTIME?	Returns the number of minutes since power-up.
*OPT?	Returns a list of installed modules and attached amplifiers
*SRE	Loads the Service Request Enable register
*SRE?	Reads the Service Request Enable register
STATE?	Returns the long-term state of the 5700A
*STB?	Returns the status byte

COMMANDS

COMMAND	PARAMETERS	RESPONSE
ADJOUT?	None	1. (Float) Amplitude 2. (String) Units 3. (Float) Frequency
BOOST	ON, OFF	None
BTYPE	VB5725, VB5205, VB5215, IB5725, or IB5220	None
BTYPE?	None	1. (String) VB<model> 2. (String) IB<model>
CAL_ADJ	None	None
CAL_CHK	None	None
CAL_CLST?	CAL, CHECK, or PREV	1. (String) List (See manual.)
CAL_CONST?	1. CAL, CHECK, or PREV 2. Name of constant	(Float) Value of the constant
CAL_DATE?	B5725, CAL, WBFLAT, WBGAIN, or ZERO	(Integer) Date as MMDDYY
CAL_DAYS?	B5725, CAL, WBFLAT, WBGAIN, or ZERO	(Integer) # of elapsed days since calibration
CAL_INTV	1, 90, 180, or 365	None
CAL_INTV?	None	(Integer) 1, 90, 180, or 365
CAL_PR	CAL, CHECK, or RAW	None
CAL_REF	Value and units of external standard	None
CAL_RNG	1. Range identifier, or NULL or STORE 2. (Only if 1 is range id.) Calibration magnitude 3. (Optional, and only if 1 is range id.) Frequency	None
CAL_RPT?	CAL, CHECK, or RAW	1. (String) Formatted report

COMMANDS (cont)

COMMAND	PARAMETERS	RESPONSE
CAL__SHIFT?	1. CAL or CHECK 2. Range identifier	1. (String) Range info. (See manual.)
CAL__SLST?	CAL or CHECK	1. (String) Info. for all ranges. (See manual.)
CAL__STORE	None	None
CAL__TEMP	Temperature in °C	None
CAL__TEMP?	B5725, CAL, WBFLAT, WBGAIN, or CHECK	(Float) Temperature in °C.
CAL__WBFLAT	START, NULL, or STORE	None
CAL__WBGAIN	PGAIN, NGAIN, or STORE	None
CAL__ZERO	None	None
CLOCK	1. 24-hour time as HHMMSS 2. Date as MMDDYY	NONE
CLOCK?	None	1. (Integer) Time as HHMMSS 2. (Integer) Date as MMDDYY
*CLS	None	None
CUR__POST	NORMAL, AUX, or IB5725	None
CUR__POST?	None	(String) NORMAL, AUX, or IB5725
OBMOUT?	None	1. (Float) Output value 2. (String) Units 3. (Float) Frequency
DIAG	ALL, D5700, DV5725, DI5725, CONT, or ABORT	None
DIAGFLT	HALT, ABORT, or CONT	None
DIAGFLT?	None	(String) HALT, ABORT, or CONT
ECHO?	Any string	(String) Same string

COMMANDS (cont)

COMMAND	PARAMETERS	RESPONSE
*ESE	Decimal equiv. of 16-bit word (0-255 only)	None
*ESE?	None	(Integer) Decimal equiv. of byte
*ESR?	None	(Integer) Decimal equiv. of byte
ETIME?	None	(Integer) # of minutes powered on
EXPLAIN?	Fault code	(String) Explanation text
EXTGUARD	ON or OFF	None
EXTSENSE	ON or OFF	None
FAULT?	None	(Integer) The fault code
FORMAT	ALL, B5725, CAL, RNG, or SETUP	None
GAL	L5100	None
*IDN?	None	(String, string, string, string) Fluke, model #, serial #, main CPU s/w rev., inguard CPU s/w rev., 5725A CPU s/w rev.)
INCR	± step size	None
ISCE	Decimal equiv. of 16-bit word	None
ISCE?	None	Decimal equiv. of 16-bit word
ISCR?	None	Decimal equiv. of 16-bit word
ISR?	None	Decimal equiv. of 16-bit word
LIMIT	1. Positive limit with unit 2. Negative limit with unit	None

COMMANDS (cont)

COMMAND	PARAMETERS	RESPONSE
LIMIT?	None	(Float, float, float, float) 1. Positive voltage limit 2. Negative voltage limit 3. Positive current limit 4. Negative current limit
LOCAL	None	None
LOCKOUT	None	None
*LRN?	None	(String) Re-configuration command
MULT	Floating-point number for use as multiplier	None
NEWREF	None	None
OFFSET	ON or OFF	None
OFFSET?	None	1. (Float) Offset value 2. (Float) Offset units
OLDREF	None	None
ONTIME?	None	(Integer) Minutes since power-up
*OPC	None	None
*OPC?	None	(Integer) 1
OPER	None	None
*OPT?	None	(Strings separated by commas)
OUT	1. (Optional) Amplitude 2. (Optional) Frequency (Either 1 or 2 is required)	None
OUT?	None	1. (Float) Amplitude 2. (String) Units 3. (Float) Frequency
OUT_ERR?	None	1. (Float) UUT error magnitude 2. (String) Units for above
PHASE	± phase in degrees	None

COMMANDS (cont)

COMMAND	PARAMETERS	RESPONSE
PHASE?	None	(Integer) Phase in degrees
PHASELCK	ON or OFF	None
PHASESFT	ON or OFF	None
*PUD	(See manual for parameter.)	None
*PUD?	None	(See manual for response.)
RANGE?	None	(String) Name of range
RANGELCK	ON or OFF	None
RCOMP	ON or OFF	None
REFOUT?	None	1. (Float) Output 2. String) Units 3. (String) Frequency
REMOTE	None	None
RPT__STR	String of up to 40 char.	None
RPT__STR?	None	(String) User report string
*RST	None	None
SCALE	ON or OFF	None
SCALE?	None	1. (Float) Nominal full-scale 2. (Float) Actual full-scale 3. (String) Units for above two
SCAL__ERR?	None	1. (Float) Scale error 2. (String) Units for scale error
SP__EOF	1. First ASCII code 2. Second ASCII code	None
SP__EOF?	None	1 (Integer) First ASCII code 2 (Integer) Second ASCII code

COMMANDS (cont)

COMMAND	PARAMETERS	RESPONSE
SP__SET	1. 110, 300, 600, 1200, 2400, 4800, (9600), or 19200 2. (TERM) or COMP 3. (XON), RTS, or NOSTALL 4. DBIT7 or (DBIT8) 5. (SBIT1) or SBIT2 6. PNONE, (PEVEN), PODD, or PIGNORE 7. CR, LF, or (CRLF)	None
SP__SET?	None	1. (Integer) Baud rate 2. (String) TERM or COMP 3. (String) XON, RTS, or NOSTALL 4. (String) DBIT7 or DBIT8 5. (String) SBIT1 or SBIT2 6. (String) PNONE, PEVEN, PODD, or PIGNORE 7. (String) CR, LF, or CRLF
SP__TIME	0 - 30	None
SP__TIME?	None	(Integer) 0 - 30, seconds
*SRE	Decimal equiv. of byte	None
*SRE?	None	Decimal equiv. of byte
STATE?	None	(See manual for response.)
*STB?	None	Decimal equiv. of byte
STBY	None	None
STOP__PR	None	None
*TST?	None	(Integer) 0, pass; 1, fail
UNCERT?	None	1. (Float) 5700A uncertainty 2. (String) Units for response 1 3. (Integer) Cal interval in days

COMMANDS (cont)

COMMAND	PARAMETERS	RESPONSE
VOUT?	None	1. (Float) amplitude 2. (String) Units 3. (Float) Frequency
*WAI	None	None
WBAND	ON or OFF	None

OPERATING STATE TRANSITIONS

FROM	TO	USE	1722A GPIB COMMAND	SERIAL COMMAND
Local	Remote	MLA + REN	REMOTE	REMOTE
Local/	LLO + REN Lockout	LOCKOUT	LOCKOUT	
Remote	Local	GTL, or "GO TO LOCAL CONTROL" softkey	LOCAL	LOCAL
	Remote/ Lockout	LLO + REN	LOCKOUT	LOCKOUT
Local/ Lockout	Remote/ Lockout	MLA + REN	REMOTE, or any 5700A command	REMOTE
Remote/ Lockout	Local	REN not	LOCAL	LOCAL
	Local/ Lockout	GTL	Manually using WBYTE	None

STATUS REGISTER SUMMARY

REGISTER	READ COMMAND	WRITE COMMAND	ENABLE REGISTER
Serial Poll Status Byte (STB)	*STB? (or SPL() for 1722A)	None	SRE
Service Request Enable Register (SRE)	*SRE?	*SRE	None
Event Status Register (ESR)	*ESR?	None	ESE
Event Status Enable Register (ESE)	*ESE?	*ESE	None
Instrument Status Register (ISR)	ISR?	None	None
Instrument Status Change Register (ISCR)	ISCR?	None	ISCE
Instrument Status Change Enable Register (ISCE)	ISCE?	ISCE	None

SERIAL POLL STATUS BYTE AND SRE BIT DEFINITIONS

7	6	5	4	3	2	1	0
0	RQS	ESB	MAV	EAV	ISCB	0	0
	MSS						

- RQS — For IEEE-488 remote control: Requesting service. The RQS bit is set to 1 whenever bits ESB, MAV, EAV, or ISCB change from 0 to 1 and are enabled (1) in the SRE. When RQS is 1, the 5700A asserts the SRQ control line. Perform a serial poll to read this bit to see if the 5700A is the source of an SRQ. (A serial poll also clears the RQS bit.)
- MSS — For serial remote control: Master summary status. Set to 1 whenever bits ESB, MAV, EAV, or ISCB are 1 and enabled (1) in the SRE. This bit can be read using the *STB? command.
- ESB — Is set to 1 when one or more enabled ESR bits are 1.
- MAV — Message available. The MAV bit is set to 1 whenever data is available in the 5700A's IEEE-488 interface output buffer.
- EAV — Error (fault) available. A fault has occurred and a fault code is available to be read from the fault queue by using the FAULT? query.
- ISCB — One or more enabled ISCR bits are 1.

ESR AND ESE BIT DEFINITIONS

15	14	13	12	11	10	9	8
0	0	0	0	0	0	0	0

7	6	5	4	3	2	1	0
PON	0	CME	EXE	DDE	QYE	0	OPC

- **PON** Power on. This bit is set to 1 if the power supply has been turned off and on since the last time the ESR was read.
- **CME** Command error (fault). The 5700A's IEEE-488 interface encountered an incorrectly formed command. (The command FAULT? fetches the earliest fault code in the fault queue, which contains fault codes for the first 15 faults that have occurred.)
- **EXE** Execution error (fault). A fault occurred while the 5700A tried to execute the last command. This could be caused, for example, by a parameter being out of range. (The command FAULT? fetches the earliest fault in the fault queue, which contains fault codes for the first 15 faults that have occurred.)
- **DDE** Device-dependent error (fault). A fault related to a device-dependent command has occurred. An example would be attempting to execute "OUT 1000000V", which is outside the range of the 5700A. (The command FAULT? fetches the earliest fault in the fault queue, which contains fault codes for the first 15 faults that have occurred.)
- **QYE** Query error (fault). The 5700A was addressed to talk when no response data was available or appropriate, or when the controller failed to retrieve data on the output queue.
- **OPC** Operation complete. All commands previous to reception of a *OPC command have been executed, and the interface is ready to accept another message.

STATUS REGISTER SUMMARY (cont)

ISR, ISCR, AND ISCE BIT DEFINITIONS

15	14	13	12	11	10	9	8
0	0	RPTBUSY	SETTLED	REMOTE	WBND	SCALE	OFFSET

7	6	5	4	3	2	1	0
PLOCK	PSHFT	RLOCK	RCOMP	BOOST	EXSENS	EXGARD	OPER

RPTBUSY When 1, A calibration report is being printed to the serial port.

SETTLED When 1, the output has stablized to within specification.

REMOTE When 1, the 5700A is under remote control.

WBND When 1, wideband is active.

SCALE When 1, scaling is active.

OFFSET When 1, an offset is active.

PLOCK When 1, the 5700A output is phase locked to an external source.

PSHFT When 1, variable phase output is active.

RLOCK When 1, the 5700A output range is locked.

RCOMP When 1, two-wire compensation is active when in resistance mode.

BOOST When 1, an auxiliary amplifier is active.

EXSENS When 1, external sensing is selected.

EXGARD When 1, external voltage guard is selected.

OPER When 1, the 5700A is operating. When 0, it is in standby.

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